Pipeline Group Factual Report

ATTACHMENT 16

IMP SEC 5 Risk Analysis Proc 08 04 2006

Carmichael, Mississippi
DCA 08 MP 001

This process addresses the overall risk analysis/information analysis process employed to support various integrity management program elements, which may include Baseline Assessment Plan development, continuing evaluation and assessment of pipeline integrity, and identification of preventive and mitigative measures.

5.1 Integration of Risk Information

For Dixie Pipeline, the pertinent information and input parameters used to characterize the relevant risk factors in the risk model are detailed in the "***Risk Analysis Procedure***".

The pertinent information and input parameters used to support the preventive and mitigative requirements and continual process of evaluation and assessment requirements for a pipeline segment are detailed in the "***Information Analysis***" procedure.

5.2 Input Information

For Dixie Pipeline, guidance for the collection of the pertinent information used to characterize the relevant risk factors in the risk model can be found in the "***Risk Analysis Procedure***".

Guidance for the collection of the pertinent information used to support the preventive and mitigative requirements and continual process of evaluation and assessment requirements for a pipeline segment can be found in the "***Information Analysis***" procedure.

5.3 Pipeline Subdividing for Risk Analysis

For Dixie Pipeline, guidance for segmenting the pipeline for risk modeling can be found in the "***Risk Analysis Procedure***".

The manner in which pipelines are subdivided for the evaluation of risk to support preventive and mitigative and continual process of evaluation and assessment activities is indicated in the "***Information Analysis***" procedure.

5.4 Facilities

For the Dixie Pipeline, guidance to identify the risks of facilities that could affect HCAs can be found in the "***Risk Analysis Procedure***".

5.5 Revision of Process

Changes to the risk evaluation process shall be completed per the Dixie Integrity Management Program "***IMP Change Management***" process.

1.0 PURPOSE:

1.1. This procedure describes the method used to evaluate the relative risk posed by each pipeline segment, in order to determine the highest priority pipeline segments for assessment scheduling and mitigation activities. Risk is defined as the: Failure Likelihood times the Consequences of Failure.

2.0 PROCEDURE:

2.1 Collection of Data

2.1.1 The Pipeline Integrity Engineer or designee will collect, analyze, and integrate all appropriate information prior to beginning the Risk Assessment Process. The latest validated information will be used. The Pipeline Integrity Engineer or designee will use the information collected to determine the risk associated with a particular pipeline segment.

2.2 Determination of Failure Likelihood

2.2.1 Failure Likelihood is a function of the Threats to a pipeline's integrity. Threats to a pipeline's integrity are listed in five categories: Third party intervention, Corrosion, Defects, Nature, and Operating Error.

2.2.2 Each Threat category has numerous criteria with which to evaluate the particular pipeline/segment's threat level. The criteria are evaluated using a scoring system of 0 to 5 representing least to greatest threat.

2.2.3 The ratings are then summed for each category to arrive at a raw Threat number.

2.2.4 This raw number is normalized by dividing the sum by the number of criteria in each Threat category.

2.2.5 This normalized number is then multiplied by a rating factor which is based on OPS Hazardous Liquid Pipeline Accident statistics for the previous two years. Subsequent upgrades to the risk analysis scoring will utilize additional years of OPS statistics for a maximum of five years. This rating factor assigns a probability to the likelihood of pipeline failure for a particular Threat based on actual historical data gathered by OPS in the two previous years. The results of this provide a weighted Threat category number.

2.2.6 The weighted numbers for each Threat category are summed to determine the total Failure Likelihood for a particular pipeline/segment.

2.3 Determination of the Consequences of Failure

2.3.1 The Consequences of Failure are a function of the Severity of a leak or spill. In this case two categories are evaluated; Environmental and Public Safety.

2.3.2 Each consequence category has numerous criteria with which to evaluate the particular pipeline/segment's threat level. The criteria are evaluated using a scoring system of 0 to 5 representing least to greatest threat.

2.3.3 The ratings are then summed for each category to arrive at a raw Consequence number.

2.3.4 This raw number is normalized by dividing the sum by the number of criteria in each Threat category.

2.3.5 This normalized number is then multiplied by a rating factor. The results of this provide a weighted Consequence number.

2.3.6 The weighted numbers for each Consequence category are summed to determine the total Consequence Score for a particular pipeline/segment.

2.4 Determination of the Risk Score

2.4.1 The Risk for each pipeline segment is determined by multiplying the Failure Likelihood by the Consequences of Failure Score.

2.4.2 A normalized risk is determined for each section by summing the risk for a particular segment multiplied by the HCA miles in that segment and dividing the total by the number of HCA miles in the section.

2.4.3 First the total risk number for the segment is obtained by summing the risk for each particular segment multiplied by the HCA miles in that segment (for Bethune to Tirzah (8.9 x 7.17) + (8.8 x 15.18) + (9.02 x 12.59) for a total section risk of 310.87).

2.4.4 This number is then divided by the total number of HCA miles in the segment (For Bethune to Tirzah 310.87/ (7.17 + 15.18 + 12.59). The result is the normalized risk for the section.

2.5 Pipeline Threat Factors

3rd Party Intervention

Pipeline in shared ROW

MOP stress/SMYS

History of 3rd party intervention related leaks/spills

Patrol frequency

Depth of cover/sand or grout bag cover

Pipeline size

Construction, development, dredging or farm activity on or near pipeline

ROW maintenance

NOP stress/ SMYS

Pipeline signs and markers

Foreign line crossings

Public awareness

Operator present during 3rd party excavation

Pipeline age

Security for above ground facilities

One call activity requiring Company response

Pipe manufacturer

Corrosion

Inspection of above ground piping and risers

Close interval survey

Electrical isolation

Internal monitoring

Rectifier inspection program within last 2 years

Corrosion coating type

Pipeline in shared ROW

Cathodic protection monitoring/results

Road/rail crossings cased/uncased

Pipeline in utility corridor

Major line replacement history due to corrosion

Pigging frequency

Most recent in-line inspection tool used for corrosion detection

Frequency of in-line inspection for corrosion detection

Atmospheric data

History of corrosion related leaks/spills (not stress corrosion cracking)

Soil resistivity

Bridge supports

Coating condition

Pipe wall thickness

Susceptibility to stress corrosion cracking

Test lead spacing

Service conversion

History of Stress Corrosion Cracking

Defects

Welding records

Pipe type

Pipe manufacturer

Pipeline age

NOP stress/SMYS

Un-repaired defects

Pipe information

History of defect related leaks/spills

Backfill

Major line replacement history due to defects

Pressure test history

Design engineering/ construction records

MOP stress/ SMYS

Anchor patterns near pipeline

Pig run made for deformation anomaly detection

Pressure cycles

Nature

Earthquake zone - NPMS

Currents in waterways/ offshore

Beach erosion for shore approach

Weight coating in water crossings/offshore

Hurricanes

ROW and terrain

Seabed/soil characteristics

Flooding - NPMS

Landslides

History of natural causes related leaks/spills

Operator Error

ESD history

Emergency response plan

Control room procedures

Control room/field coordination

Training program

Operator qualification

Leak/spill drills

Contractor qualification

Remedial action for incidents, leaks or near misses

History of operator error related leaks/spills

2.6 Pipeline Leak/Spill Consequence Factors

Environment

Proximity to populated areas

Proximity to navigable waterways (NW's) per NPMS

Proximity to Unusually Sensitive Areas (USA's) per NPMS

Potential leak/spill quantity

Proximity to other rivers, creeks or streams

Proximity to congregation areas (CA's)

Product transported

Extent of hazard zone from rupture

Terrain

Leak detection system

Scada system

Local authorities' relationships

Soil Characteristics

Consequences for USA's and Navigable Waterways

Injuries and Fatalities

Proximity to congregation areas

Proximity to populated areas

Evacuation of local population

Potential spill/leak quantity

Product transported

Extent of hazard zone from rupture

Local authorities' relationships

Leak detection system

ROV's or intermediate check valves installed

Consequences to Populated Areas

Public Awareness

Intermediate block valves

2.7. Risk Assessment Process Facilities

2.7.1. The process used to evaluate the relative risk posed by each facility, in order to determine the highest priority for assessment scheduling and mitigation activities is very similar to the process used for pipeline segments. However, facilities require specialized data gathering, risk assessment, inspection tools and techniques, and mitigation.

2.7.2. The process includes a thorough review of the incident history of the facility and other similar facilities.

2.7.3. The Pipeline Integrity Engineer or designee will collect, analyze, and integrate all appropriate information prior to beginning the Risk Assessment Process. The latest validated information will be used.

2.7.4. The Pipeline Integrity Engineer or designee will use the information collected to determine the risk associated with a particular facility.

2.7.5. The risk associated with each facility is used to evaluate and implement appropriate preventative and mitigative measures.

2.8 Facility Threat Factors

3rd Party Intervention

Facility in Developed Area

History of 3rd party intervention related leaks/spills

Hours Staffed

Facility size

Signs and markers

Public awareness

Facility age

Security for above ground facilities (locks, fences)

Corrosion

Inspection of above ground equipment

Tank/Vessel Inspection/ monitoring

Equipment Inspection/Monitoring

Most recent inspection

Frequency of inspection for corrosion

Atmospheric data

History of corrosion related leaks/spills (not stress corrosion cracking)

History of Stress Corrosion Cracking

Defects

Welding records

Facility Equipment age

Un-repaired defects

History of defect related leaks/spills

Pressure test history

Design engineering/ construction records

Nature

Earthquake zone - NPMS

Hurricanes

Terrain

Soil characteristics

Flooding - NPMS

Landslides

History of natural causes related leaks/spills

Operator Error

Emergency response plan

Control room procedures

Control room/field coordination

Training program

Operator qualification

Leak/spill drills

Contractor qualification

Remedial action for incidents, leaks or near misses

History of operator error related leaks/spills

2.9 Facility Leak/Spill Consequence Factors

Environment

Proximity to populated areas

Proximity to navigable waterways (NW's) per NPMS

Proximity to Unusually Sensitive Areas (USA's) per NPMS

Potential leak/spill quantity

Proximity to other rivers, creeks or streams

Proximity to congregation areas (CA's)

Product

Extent of hazard zone from rupture

Terrain
Leak detection system
Scada system
Local authorities' relationships
Soil Characteristics

Injuries and Fatalities
Proximity to congregation areas
Proximity to populated areas
Evacuation of local population

Potential spill/leak quantity
Product transported
Extent of hazard zone from rupture
Local authorities' relationships
Leak detection system
ROV's or intermediate check valves installed
Consequences to Populated Areas
Public Awareness
Intermediate block valves

3.0 REFERENCES:

3.1 **Regulatory** -

3.1.1 49 CFR 195

3.1.2 16 TAC 8.101

3.2 **Related Policies/Procedures** –

3.2.1 N/A

3.3 **Forms and Attachments** -

3.3.1 N/A

4.0 DEFINITIONS:

4.1 N/A

➢➢➢End of Procedure≺≺≺

Change Log

Date	Rev. #	Change Location	Brief Description of Change
08/04/2006	0	Entire Document	Created document